

## Abstract of the Disclosure

A method is described for determining a 2D gradient magnitude image from a range image of an object. The range image includes intensity values at pixel locations. The intensity values correspond to distances to a surface of the object. For each pixel  $(i,j)$  in the range image, a horizontal central difference  $dx$  value and a vertical central difference  $dy$  value are determined. Then, the 2D gradient magnitude image value at each pixel  $(i,j)$  is set to  $0.5 * \sqrt{dx^2 + dy^2 + 4}$ . The range image can be scaled so that a unit intensity value at each pixel corresponds to a unit distance value. The magnitude of a gradient at a 3D point  $\mathbf{p}$  can then be determined from the scaled range image and the gradient magnitude image. First, a perpendicular projection  $(x,y)$  of  $\mathbf{p}$  onto the scaled range image is computed. Next, a gradient magnitude at  $(x,y)$  is interpolated from the corresponding values of the 2D gradient magnitude image near the location  $(x,y)$ . Finally, the magnitude of the gradient at  $\mathbf{p}$  is set to the interpolated gradient magnitude at  $(x,y)$ .